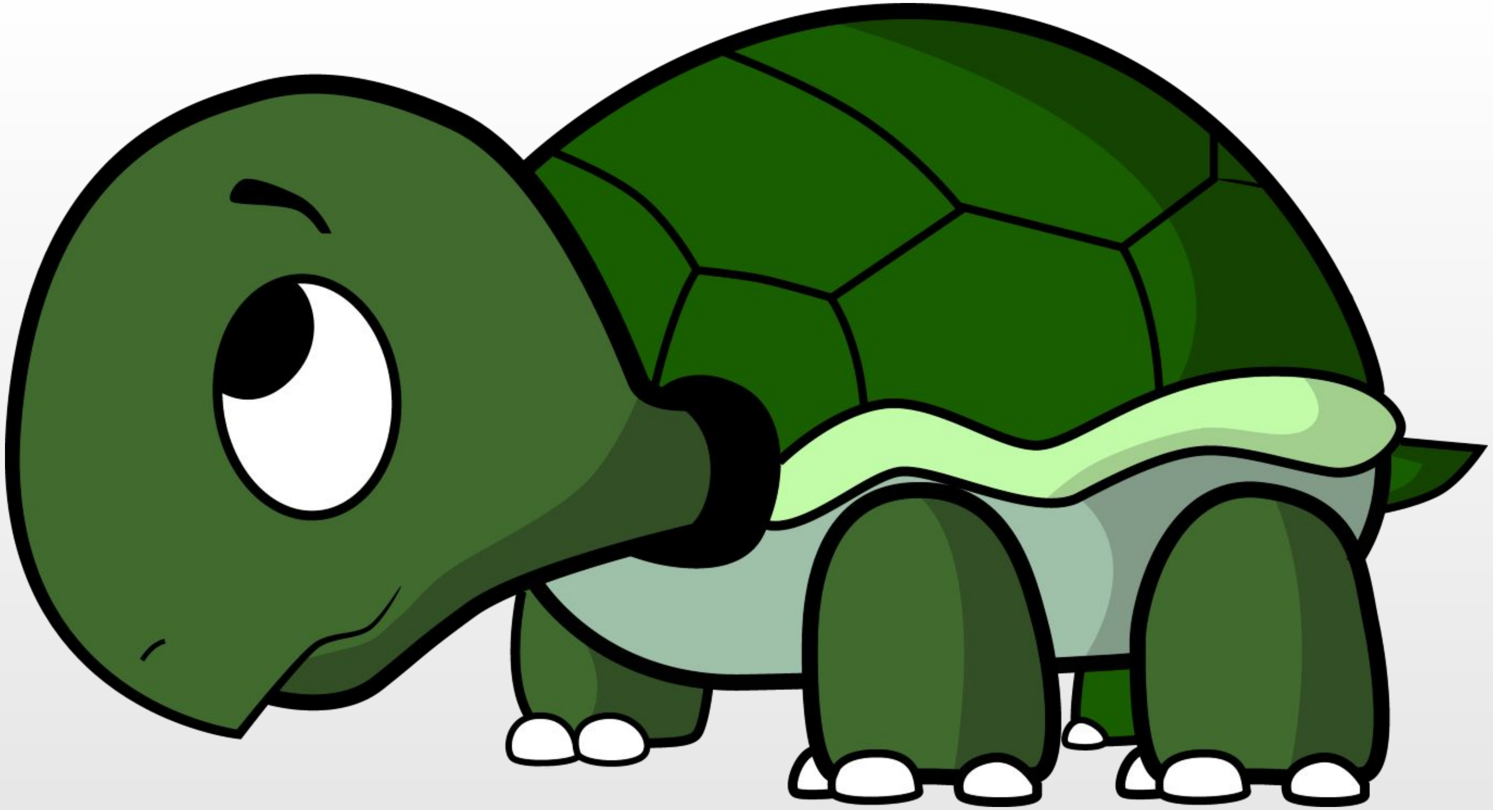


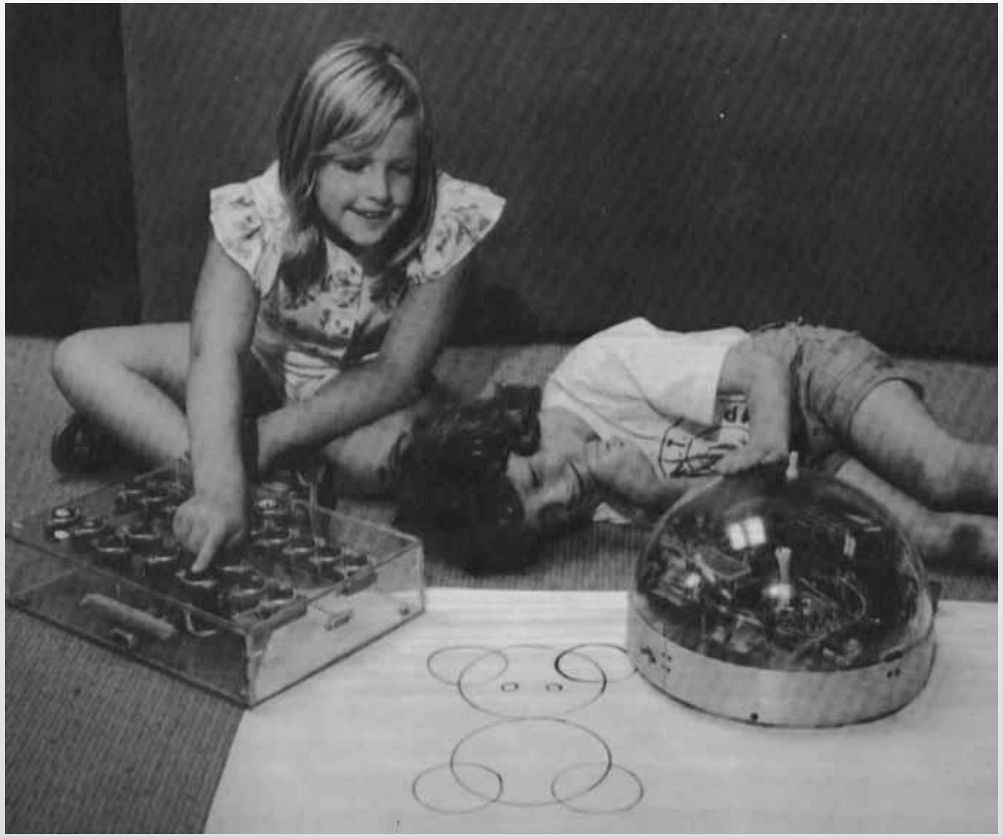
Turtle Graphics

Let’s see what we can draw on Python!

A first Object: Logo Turtle

- Dr. Seymour Papert at MIT invented the Turtle as a graphical and mathematical object to think with for the children's programming language, Logo (1966)

- Children programmed robot turtles to draw pictures



Turtle Graphics

- Turtle uses the foundation of a coordinate (xy) plane in order to help draw its graphics
- Python has a built-in module that supports turtle graphics called “turtle”
- Importing this module gives you access to all the functions necessary in order to draw <u>vectors</u> on the screen

Turtle Graphics

- In Turtle, you control a cursor, also know as the “turtle”
- It has the following properties:

1. A position in 2D space on the coordinate plane
2. An orientation, or heading
3. A pen that can lay down color on the canvas

Setting up your environment

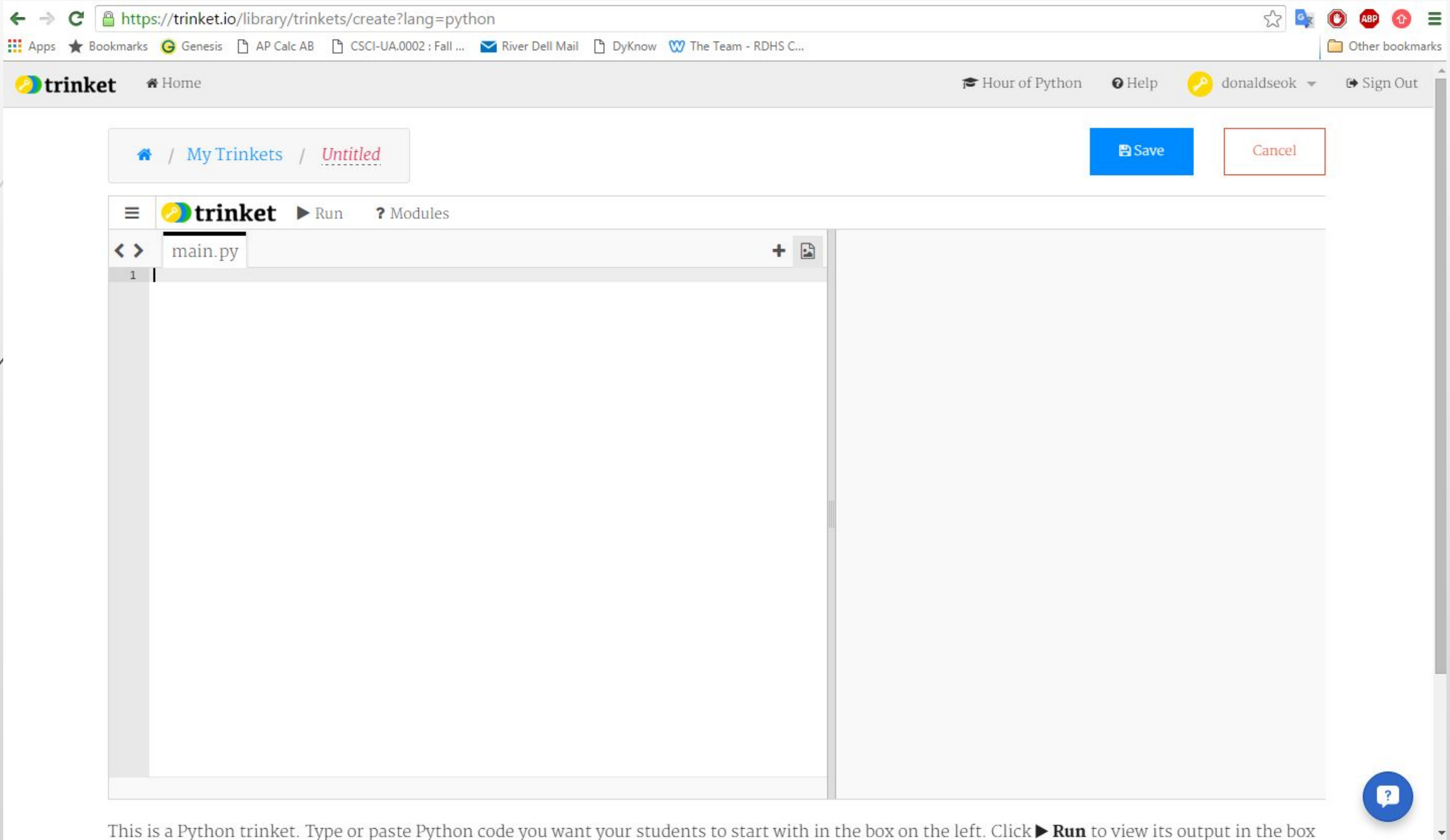
```
#first we need to import the turtle module
import turtle

timmy = turtle.Turtle() # declaring a variable named timmy
                         # of type turtle.
# set a title for your window
timmy.title(“My turtle animation”)

# set up the screen size (in pixels – 400 x 400)
# set up the starting point of the turtle (0,0) – origin
timmy.setup(400,400,0,0)
```

Setting up your environment

https://hourofpython.trinket.io/a-visual-introduction-to-python#/turtles/meet-tina

- However this website was somewhat created for the sake of using Turtle, not so much Python in it's entirety
- So, the environment is already set up for you as a 400 x 400 canvas window and the turtle is set to start at the origin (0, 0)

trinket.io/Python



This is a Python trinket. Type or paste Python code you want your students to start with in the box on the left. Click ▶ **Run** to view its output in the box

Important Note!

- Do not name your Python source code file “turtle.py”
- This will prevent Python from finding the correct “turtle.py” module when using the import turtle statement at the top of your program

Getting rid of your turtle window

- This function call will cause your turtle window to deactivate when you click on it. Place it at the end of your turtle program.

```
turtle.exitonclick()
```

- This will not be applicable on the website

Basic Turtle Functions

- You can move your turtle forward by using the following command:

```
turtle.forward(pixels)   #pixels can also be denoted by the
                          number of spaces you want to move
```

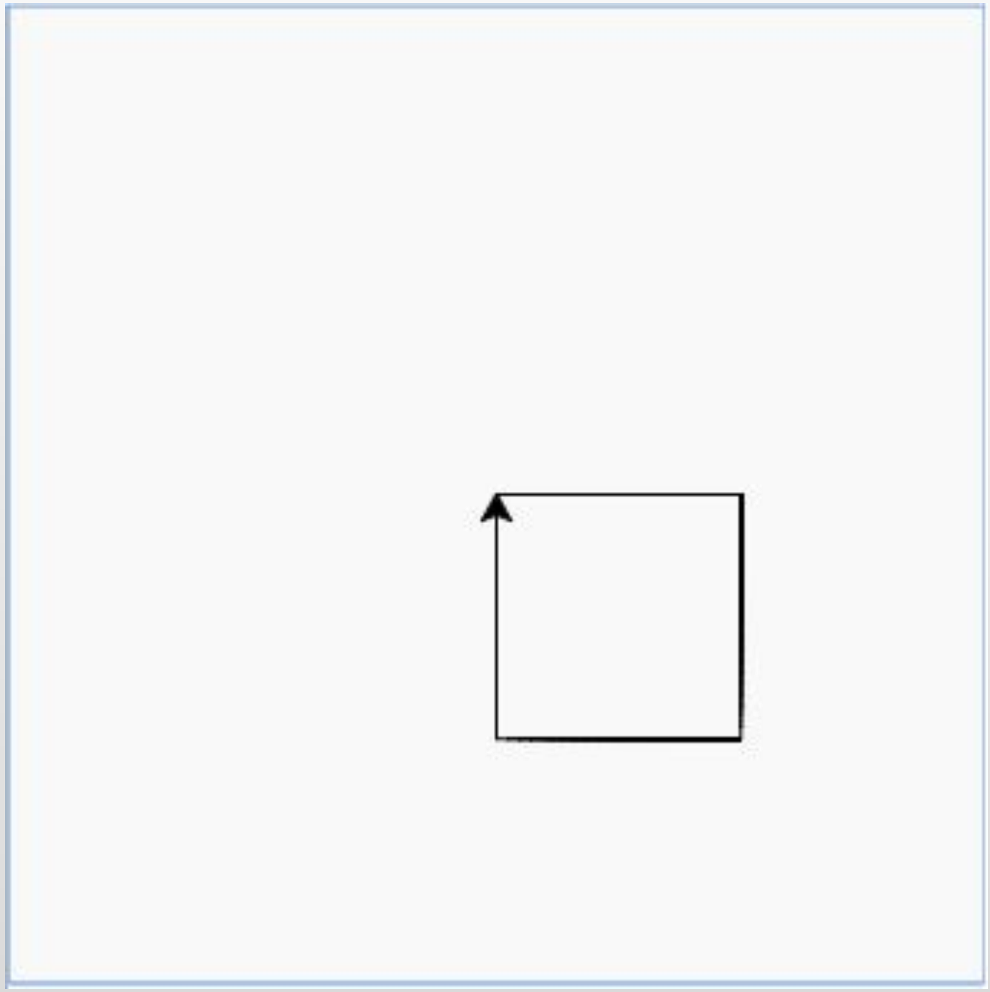
- And you can have your turtle turn by using the following commands:

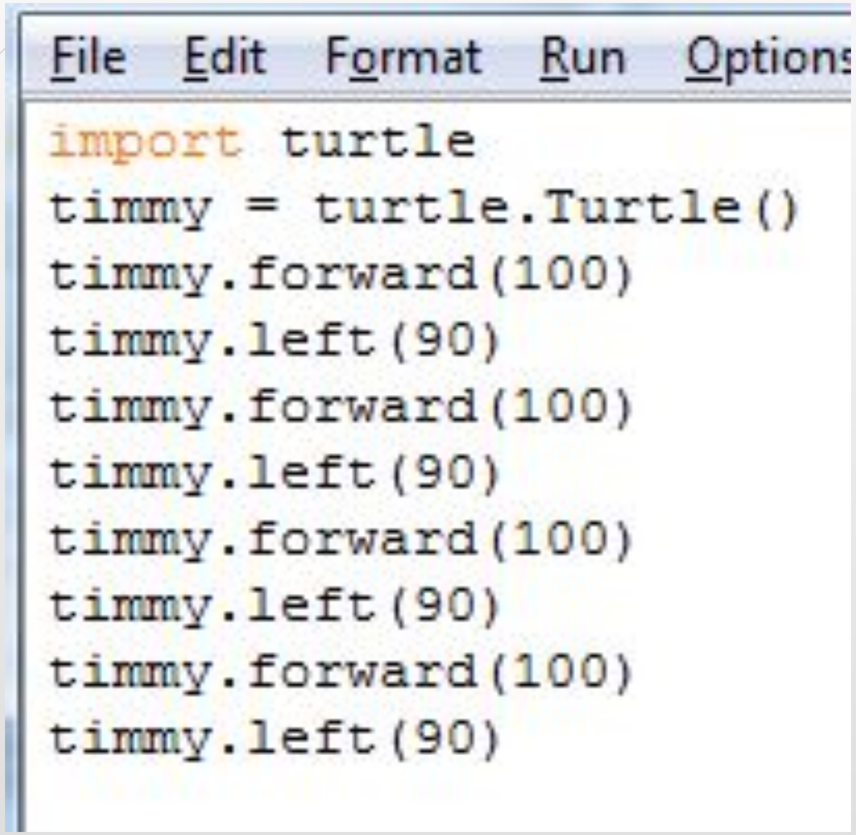
```
turtle.right(degrees)
turtle.left(degrees)
```

- Your turtle will continually “draw” while it’s moving

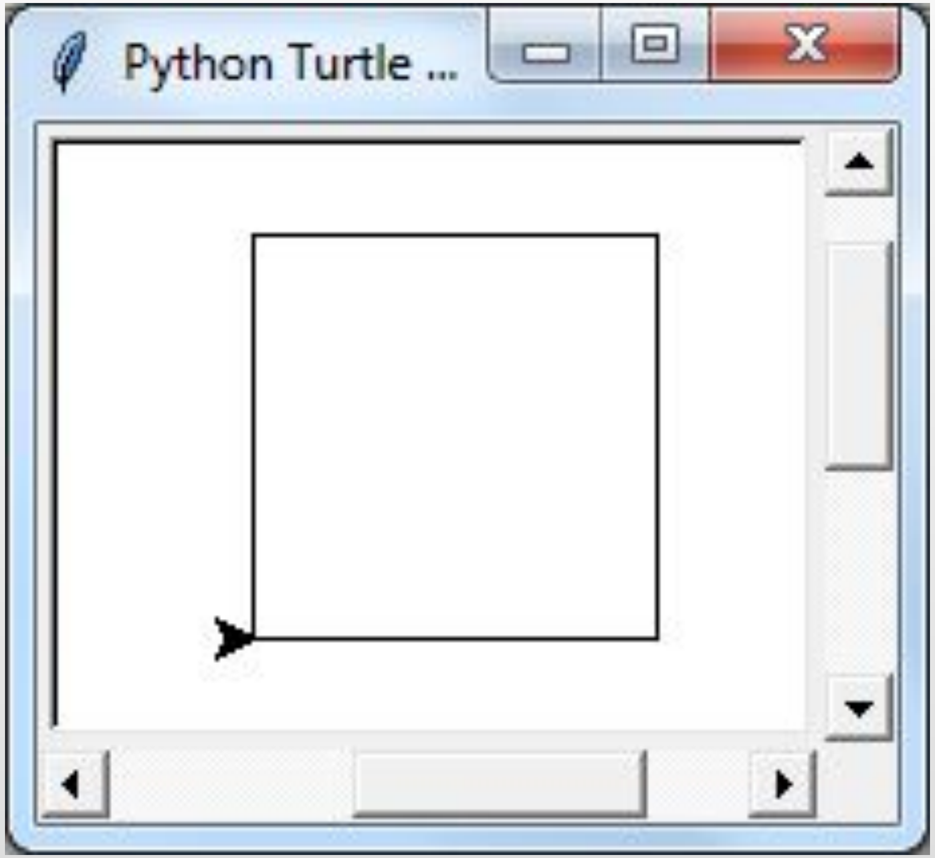
Programming Exercise

- Draw a box

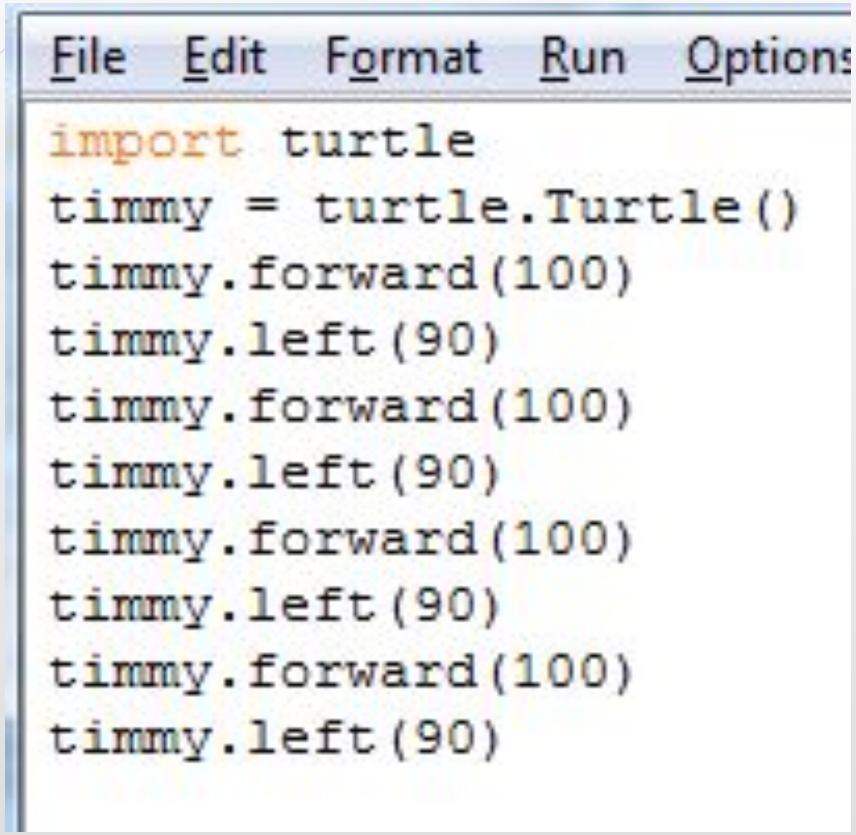




```
import turtle
timmy = turtle.Turtle()
timmy.forward(100)
timmy.left(90)
timmy.forward(100)
timmy.left(90)
timmy.forward(100)
timmy.left(90)
timmy.forward(100)
timmy.left(90)
```



How can we make this code shorter?



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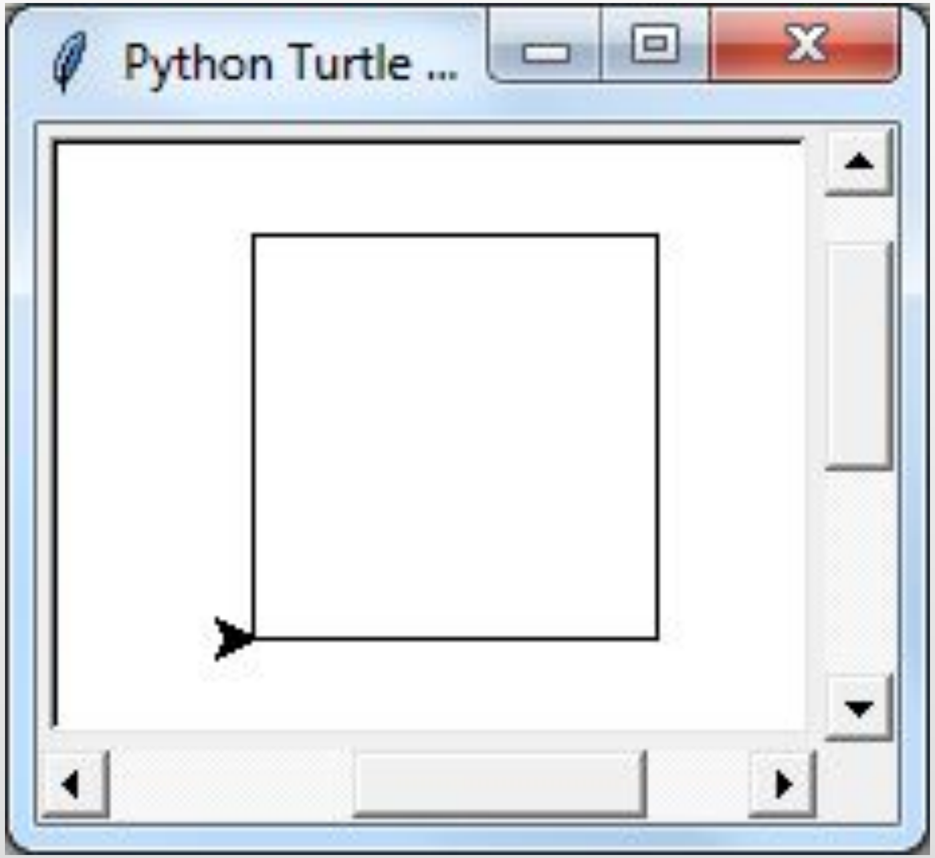

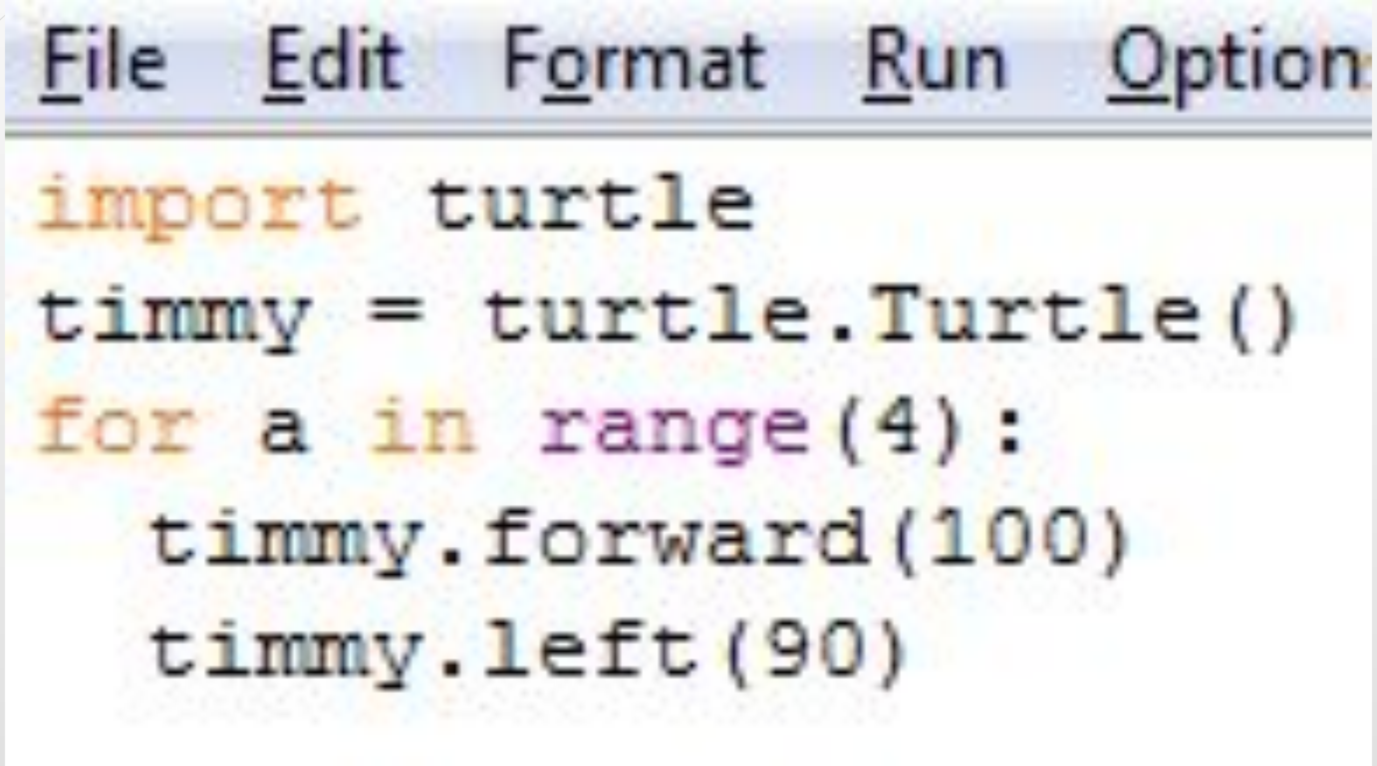

```
import turtle
timmy = turtle.Turtle()
for a in range(4):
  timmy.forward(100)
  timmy.left(90)
```

Moving your turtle

- You can also command your turtle to move to any coordinate on the screen by using the turtle.goto() function
- This function accepts two arguments, x and y, denoting the x and y coordinates on the coordinate plane

```
turtle.goto(50,50)
```

- Note however that your pen will continue to draw as you move your turtle to a new position

Moving your turtle

- You may have guessed that if your pen keeps on drawing, you may end up with a bunch of lines that you might not want …
- You can tell the turtle to stop drawing by using the turtle.penup() function. You can tell the turtle to start drawing again by using the turtle.pendown() function

To Do:

Go to https://hourofpython.trinket.io/a-visual-introduction-to-python#/turtles/meet-tina and work through the exercises

Try the new exercises posted